



# CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

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<b>Project Title</b> <b>Clothing Material Matters</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to determine the insulating properties of different fabrics under different environmental conditions. I wanted to verify or refute some sayings like, "Cotton kills", "Wool is warmer" and "A space blanket can save your life".</p> <p><b>Methods/Materials</b> My experimental model was a hot water filled container that lost a constant amount of heat to the environment through different fabrics as its temperature decreased by 5° C. By measuring the time for the heat to be lost, the relative insulation performance of each fabric could be determined. Four different environmental conditions: Dry, Wind, Wet (simulating falling into a lake and getting out) and Wet Wind were used. 5 materials: Cotton, Thin Wool, Thick Wool, Windzone (a synthetic polyester fleece) and Space Blanket plus a control with no fabric were tested in each of the 4 conditions. A ThermaData Logger thermometer with two probes stored the water temperature for two simultaneous experiments at six second intervals and could be downloaded into my computer. The weights of the same sized material pieces were also measured to compare the fabrics with compensation for weight differences.</p> <p><b>Results</b> Cotton was the worst performer in all conditions. Cotton in wet conditions allowed very rapid heat loss and was worse than control! Windzone was a top performer in all conditions, well above control. Space Blanket also did very well in all conditions and when weight was considered it blew away the competition by a factor of 10-20. Wool did not do very well in Wet for this model of heat loss right after an immersion in water. Thin wool was only a little better than cotton in the wet and was worse than control. The results for thick wool were mixed with below control results in the wet though it did outdo control in wet wind. It was noted that wool dried very fast compared to cotton so not long after the test period it began to insulate like dry wool again.</p> <p><b>Conclusions/Discussion</b> If I fall into a river out in the cold and wind, my experimental data suggests that the best plan is to get out of my cotton and wool clothing (Windzone could be left on), and wrap up in my space blanket in a nice wind sheltered area while the woolen clothing is drying. Cotton can kill, wool is not warmer than a good synthetic fleece and I am always going to include a superlight and compact space blanket in any emergency kit.</p>	
<b>Summary Statement</b> In my project I compared the thermal insulation of different clothing materials in a variety of environmental conditions.	
<b>Help Received</b> Mother helped organize board; Father bought ThermaData Logger thermometer; Patagonia gave clothing material samples.	